

# Lessons Learnt at Farringdon – Embodied Carbon

## Overview

The aim of this case study is to compare the quantity of concrete and steel reinforcement required for a lift shaft foundation using different load cases and demonstrate reduction of materials by challenging collision impact loading requirements in accordance with LU standards

As part of the works for the Farringdon Station redevelopment project, a lift is to be installed in the London Underground Station. The 18 persons lift is to travel between the station concourse and the island platforms 2 and 3, with a travelling distance of 4.5metres.

The lift shaft is a steel framed structure with concrete encasement to the concourse level. The foundation for the lift is a reinforced concrete ground bearing base. As the lift is situated on island platform it has to be designed in accordance with LU Standard 1-053 to resist 500kN horizontal load at any direction.

## Innovation

Three cases have been considered to compare the amount of concrete and steel required for the lift foundation. The first case is to design the foundation to resist 500 kN horizontal collision load at any direction, in accordance with LU standard 1-053, the second case is without and the third case is to use mini piles and pile cap without the collision loading.

The findings of the calculations are below.

Foundation Type/ Load Case	Foundation Size	Amount of Concrete	Amount of Steel
A - Pad Foundation/ 500kN Collision Load	5m×5.5m×2.8m	77m <sup>3</sup>	11tons
B – Pad Foundation/ No Collision Load	3.9m×3.2m×2.8m	35m <sup>3</sup>	7tons
C – Pile cap and mini Piles / No Collision Load	Pilecap 3.9m×3.2m×0.65m + 9No 300dia 12m piles	16m <sup>3</sup>	5tons

## Conclusion

The amount of concrete and steel could be substantially reduced if the LU standard for the collision impact loading requirement had been challenged and other means of eliminating collision risks had been provided i.e. strengthening platform walls to act as barrier against collision.

The amount of materials could have been minimised if construction planning and methodology details were discussed with the contractor before the design and piled foundation solution was agreed.

